

## CLAIMS

What is claimed is:

- 1 1. A mobile Internet Protocol extension, comprising:  
2 a type field containing a type value identifying a collection of extensions having a  
3 common data type;  
4 a sub-type field containing a unique number assigned to a member of the  
5 collection of extensions identified by the type value within the type field; and  
6 a data field containing the data associated with the extension.
- 1 2. The mobile Internet Protocol extension of claim 1, further comprising:  
2 a length field indicating a length in bytes of the data field within the extension.
- 1 3. The mobile Internet Protocol extension of claim 1, wherein the sub-type field  
2 follows the type field within a short format for the extension.
- 1 4. The mobile Internet Protocol extension of claim 1, wherein the sub-type field is  
2 separated from the type field by a length field within a long format for the extension.
- 1 5. The mobile Internet Protocol extension of claim 1, wherein the type field is a first  
2 field within the extension, followed by the sub-type field and then a length field within a  
3 long format for the extension and followed by the length field and then the sub-type field  
4 within a short format for the extension.
- 1 6. The mobile Internet Protocol extension of claim 1, wherein the type field contains  
2 a type value identifying a group of authentication extensions and the data field contains a  
3 security parameter index and an authenticator.
- 1 7. The mobile Internet Protocol extension of claim 1, wherein the type field contains  
2 a type value identifying a group of key extensions and the data field contains a first  
3 security parameter index, a second security parameter index, and security information

4 required to create a security association.

1 8. The mobile Internet Protocol extension of claim 1, wherein the type field contains  
2 a type value identifying a group of network access identifiers and the data field contains a  
3 network access identifier.

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1 9. A method of extending control messages within a mobile Internet Protocol  
2 network, comprising:

3 storing a type value identifying a collection of extensions having a common data  
4 type within a type field for a message extension;

5 storing a unique number assigned to a member of the collection of extensions  
6 identified by the type value within the type field within a sub-type field for the message  
7 extension; and

8 storing the data associated with the extension within a data field for the message  
9 extension.

1 10. The method of claim 9, further comprising:

2 storing a length in bytes of the data field within a length field for the message  
3 extension.

1 11. The method of claim 9, further comprising:

2 placing the sub-type field after the type field within a short format for the  
3 message extension.

1 12. The method of claim 9, further comprising:

2 placing a length field between the sub-type field and the type field within a long  
3 format for the extension.

1 13. The method of claim 9, further comprising:

2 placing the type field first within the extension, followed by the sub-type field and  
3 then a length field within a long format for the extension and followed by the length field  
4 and then the sub-type field within a short format for the extension.

1 14. The method of claim 9, wherein the step of storing a type value identifying a  
2 collection of extensions having a common data type within a type field for a message  
3 extension further comprises:

4 storing a type value identifying a group of authentication extensions within the  
5 type field, wherein the data field contains a security parameter index and an  
6 authenticator.

1 15. The method of claim 9, wherein the step of storing a type value identifying a  
2 collection of extensions having a common data type within a type field for a message  
3 extension further comprises:

4 storing a type value identifying a group of key extensions within the type field,  
5 wherein the data field contains a first security parameter index, a second security  
6 parameter index, and security information required to create a security association.

1 16. The method of claim 9, wherein the step of storing a type value identifying a  
2 collection of extensions having a common data type within a type field for a message  
3 extension further comprises:

4 storing a type value identifying a group of network access identifiers within the  
5 type field, wherein the data field contains a network access identifier.

- 1 17. An Internet Protocol network supporting mobile connections, comprising:  
2 a mobile communications device;  
3 a home agent within a home network for the mobile communications device;  
4 a foreign agent within a network to which the mobile communications device is  
5 connected, wherein the home agent and the foreign agent communicate utilizing  
6 control messages which may be extended by an extension including:  
7 a type field identifying a collection of extensions having a common data  
8 type,  
9 a sub-type field identifying a member of the collection of extensions  
10 identified by the type field, and  
11 a data field containing the data associated with the extension.
- 1 18. The network of claim 17, wherein the sub-type field is placed in a first location  
2 within the extension for a short format of the extension and in a second location within  
3 the extension for a long format of the extension.
- 1 19. The network of claim 17, wherein the extension includes a length field specifying  
2 a length of the data field in bytes.
- 1 20. The network of claim 17, wherein the type field identifies a group of extensions  
2 selected from the group including an authentication extension, a key extension, and a  
3 network access identifier extension.